

## **Exhibit H**

Review

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## The Impact of Cost-Sharing on Appropriate Utilization and Health Status: A Review of the Literature on Seniors

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*This article provides a review of research that has addressed the impact of patient cost-sharing on the use of services and resulting health status impacts, among the population age 65 and older. Nearly all of the 22 relevant studies examined that have been published since 1990—16 focusing on cost-sharing for prescription drugs and 6 on cost-sharing for medical services—conclude that increased cost-sharing reduces either or both the utilization and health status of seniors. Most of the studies, however, rely on cross-sectional and self-reported data. Further research, employing stronger study designs as well as clinical and administrative data, is necessary before drawing more definitive conclusions.*

**Keywords:** *cost-sharing; prescription drugs; utilization; seniors; health status*

Economists often suggest that patient cost-sharing is an effective way of controlling health care expenditures. Recently, in reaction to the resurgence of

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health care cost inflation, many firms have raised employee cost-sharing requirements, both directly as well as indirectly through offering so-called "consumer-driven" health care products that often include large deductibles (Gabel, LoSasso, and Rice 2002). A question of major policy importance is whether health policy related to seniors should also move toward greater patient cost-sharing.

Cost-sharing, of course, is hardly new to seniors. Medicare has substantial gaps in coverage and levies various charges on covered services. Nevertheless, recent years have seen the greater use of cost-sharing, with more on the horizon. Among Medicare managed care plans, the percentage of beneficiaries facing cost-sharing for inpatient admissions rose from just 4 percent in 1999 to 80 percent in 2002 (Achman and Gold 2002). Those facing a copayment of \$10 or more for primary care jumped from 5 percent to 42 percent between 1999 and 2003; the figures for specialist care show a similar pattern, rising from 18 percent to 82 percent. Copayments for prescription drugs also increased quickly. In 1999, 14 percent of Medicare managed care plan enrollees paid more than \$20 for a brand-name drug, but 4 years later it was 74 percent (Achman and Gold 2002).

At the time of this writing, President Bush had just signed into law the Medicare Prescription Drug, Improvement, and Modernization Act of 2003. The legislation provides outpatient prescription drug coverage under Medicare for the first time. This coverage, which becomes effective in 2006, contains a \$250 annual deductible; 25 percent patient cost-sharing on the next \$2,000 of prescription drug spending; 100 percent patient cost-sharing on the next \$2,850 in drug spending (the so-called doughnut hole), and, after the patient has spent \$3,600 out of pocket, 95 percent catastrophic coverage. Thus, the legislation requires substantial patient cost-sharing.

The advisability of increased cost-sharing for seniors hinges on its anticipated impact of utilization and expenditures, and perhaps more important, its effect on health status. As noted, it is generally believed that cost-sharing will result in lower service usage. The key issue for policy makers concerns the types of services that will be forgone. Will they be ones that are important to improving or stabilizing health, or alternatively, ones of little value? In a recent report to Congress, the Medicare Payment Advisory Commission expressed concern about supplemental insurance that provides first-dollar coverage, noting that, "In some instances, when decisions to seek care are discretionary, this could lead beneficiaries to seek care or providers to order services that may be of marginal value" (2002, p. 20).

Unfortunately, relatively little is known about these topics because the major research study on these issues, the RAND Health Insurance Experiment, was conducted 20 years ago and excluded seniors from its design. There

are several reasons to believe that seniors would respond differently to cost-sharing than would their younger counterparts. One determinant of price responsiveness is the necessity of a product, another is the availability of substitutes, and a third is the proportion of income spent on the product.<sup>1</sup> Goods that are viewed as necessities and for which there are few substitutes tend to be less price sensitive, as are those goods that comprise a lower proportion of income.

When considering these three factors more closely, the first two would tend to decrease the price responsiveness of seniors to prescription drug cost-sharing compared to younger people, but the last would tend to work in the opposite direction. (Which of these effects will dominate is difficult to predict.) On one hand, seniors have far more chronic ailments that call for the use of prescription drugs, so they probably view drugs as more necessary. Similarly, they may believe that there are fewer substitutes for drugs—which is probably true since lifestyle changes are less effective as a person ages. On the other hand, prescription drugs compose a far greater proportion of seniors' incomes. In 1998, the average senior spent \$465 out of pocket on prescribed medications, compared to \$137 for younger individuals (U.S. Department of Health and Human Services 2002). This factor, in turn, would make them more sensitive to higher cost-sharing for prescription drugs.

There have been a number of recent studies of seniors that shed some light on these issues; these are reviewed in the main body of the article. The relevant studies are summarized in four tables and discussed in corresponding sections: one on health status and the other on the appropriateness of utilization (which is defined in more detail below). Within each, we present studies of medical services and prescription drugs separately. Most recent research has focused on the latter, but a limited amount of research has been conducted on the former as well. We then subdivide the studies in a different way: according to whether they examine the impact of supplemental insurance or instead examine cost-sharing requirements directly. The article ends with a discussion of how findings from this literature review can inform future public policy.

### NEW CONTRIBUTION

Our literature search found no examples of comprehensive, critical literature reviews that examine the impact of cost-sharing for both medical services and prescription drugs on the utilization and health status of seniors. One previous study does provide a review of previous research in the area of prescription drugs (Adams, Soumerai, and Ross-Degnan 2001). The key differences of our study are that (1) we consider cost-sharing for both services and drugs, (2) focus only on studies that examine either health status effects or the

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appropriate utilization of prescriptions, and (3) have access to studies published through 2002 rather than 2000. Of the 16 studies meeting our selection criteria that focus on prescription drugs, 10 were published in 2000 or 2001, and therefore were not included in the review by Adams, Soumerai, and Ross-Degnan (2001).

### PREDICTED EFFECTS OF COST-SHARING

Moral hazard exists when the possession of an insurance policy increases the likelihood of incurring a covered loss, and/or the size of a covered loss. The term dates back to the purchase of fire insurance in the 19th century (Moore 1877). It was recognized that a business or person that had fire insurance on a property might be more likely to incur a loss—either by deliberately setting a fire (hence, “moral” hazard) or by being less diligent in ensuring that a fire would not start in the first place.

In the health services area, the existence of moral hazard implies that people use more services when they are insured, or are more fully insured. But as Mark Pauly (1968) pointed out in his famous essay on the subject, “The response of seeking more medical care with insurance than in its absence is a result not of moral perfidy, but of rational economic behavior” (p. 535). For a fully insured person, the cost of using an additional service will be shared by everyone who pays premiums. Thus, the person is likely to use more services than if he or she paid the full cost of the additional service.

Despite the fact that moral hazard in medical care is an example of rational economic behavior, many economists are nevertheless troubled by its existence. When people are fully insured, they may demand services that only provide a small amount of benefit. But these services are likely to cost society just as much as any other services. Thus, the benefits people derive from the purchase of these so-called marginal services might be swamped by their cost, leading to what has been coined as a societal *welfare loss*. Pauly showed that patient cost-sharing would reduce the amount of moral hazard (and thus, societal welfare loss): people would be expected to demand fewer services of marginal value because the price they would have to pay would exceed the utility provided by some of those services.

Thus, economic theory clearly predicts that people will use fewer services when they face cost-sharing. Less clear is how cost-sharing will affect the kinds of services that people use. Will they forgo more of the services that provide little health value, or will they cut utilization across the board? One aspect of the RAND Health Insurance Experiment explicitly tested this notion and found that the institution of cost-sharing led to the same reduction in

usage for services judged by medical experts to be medically effective as those judged to be less effective or ineffective (Lohr et al. 1986).<sup>2</sup>

How well informed consumers are about the medical appropriateness of alternative services is a topic largely beyond the scope of this article. Parallel research has been conducted, however, on the ability of seniors to accurately interpret information about health plan performance. Hibbard and colleagues (2001) found that Medicare beneficiaries were much less facile at using comparative health plan information, making 3 times as many errors.

In summary, we would expect cost-sharing to reduce service usage among seniors, but theory provides less guidance regarding its impact on health. If seniors are well informed about benefits from a particular service in comparison to its cost, then they will tend to continue demanding such services. If, however, they cannot perform this calculus, they are more likely to cut back in a less discriminating manner—perhaps harming their health. Even if they can perform this calculus, cost-sharing could result in adverse health consequences for seniors if they must forego their needed medication because of costs, or if they cut back on other basic necessities to help pay for their health care.

## METHODS

Both manual and online searches (PubMed, Ingenta, EconLit, and Science-direct) were conducted to locate studies about cost-sharing and its effect on the appropriateness of service and prescription drug utilization among seniors and its associated health effects. Search terms included combinations of the following keywords: "supplemental insurance," "cost-sharing," "health outcomes," "aged" and "elderly."

Articles published prior to 1990 and studies conducted outside of the United States or Canada were excluded to maintain data manageability and enhance policy relevance. Studies that included, but were not limited to, the senior population (defined here as 65 years of age or older and/or Medicare beneficiaries) were also excluded unless separate data analyses were conducted for the 65-plus subsample. Eight studies were excluded because of that criterion. Cross-sectional studies were excluded if they did not employ multivariate analysis or provide some form of a control group. And finally, only data analyses are featured in this literature review.

We were able to identify 22<sup>3</sup> studies using these selection criteria. All of the studies took place in the United States except for 3 that focused on an increase in prescription drug copayments in the province of Quebec, Canada, and 1 that examined the effect of reference pricing for angiotensin converting

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enzyme (ACE) inhibitors in British Columbia, Canada. Only 7 studies measured the health outcomes of cost-sharing directly.<sup>4</sup> However, many studies found that cost-sharing resulted in service or drug-utilization changes in which health outcomes were strongly implied: for example, drug noncompliance and/or dosage skipping because of costs<sup>5</sup>; spending less on basic necessities to pay for prescription drugs; emergency department admissions; preventable hospitalizations; delays in seeking emergency care; or preventive services forgone due to costs. For this review, such responses to increased cost-sharing were considered inappropriate insofar as they subject individuals to increased mortality and/or morbidity risk.

## FINDINGS

### THE EFFECT OF COST-SHARING ON SENIORS' HEALTH

We first present results from the 7 studies that directly examine how cost-sharing affects the health status of seniors (see Table 1A and Table 1B). (Study limitations are listed in the tables for each of the studies included.) Table 1A provides information on the 4 studies finding a negative health impact, and in Table 1B, the 3 studies that do not show such an effect. Three of the 6 studies examine services, and 4 focus on prescription drugs.

Of particular interest are the 5 studies that examine mortality. Two (Doescher et al. 2000; Lichtenberg 2002) find that more cost-sharing increases mortality rates among seniors, and 3 (Magid et al. 1997; Pilote et al. 2002; Schneeweiss, Walker, et al. 2002) do not. Interestingly, 2 of the studies showing no mortality effects examined individuals who had suffered a heart attack.

Lichtenberg (2002) takes on a challenging research issue: does Medicare coverage reduce mortality? He finds that when people turn 65 and become eligible for Medicare, on average they utilize 2.8 percent more physician visits per year, and that this rise in usage apparently leads to a slower growth in the probability of dying. The results should be viewed with caution, however, because other life events also occur when a person turns age 65 (e.g., many retire). In addition, the study is unable to address the extent to which a person's health benefits increase when they become Medicare-eligible.

The other study that found greater mortality to be associated with higher cost-sharing used information from a national sample of patients (Doescher et al. 2000). It assessed whether particular forms of supplemental insurance (or lack of any such coverage) put them at risk for high out-of-pocket

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TABLE 1A Health Outcomes Measured Directly: Negative Effect on Health Outcome

<i>Citation</i>	<i>Sample/Data Source</i>	<i>Cost-Sharing Arrangement</i>	<i>Impact on Service Use</i>	<i>Health Outcome</i>	<i>Study Limitations</i>
Services Doescher et al. (2000, 251-57).	3,751 65-plus-year-old patients covered by Medicare and some form of private supplemental insurance. 1987 National Medical Expenditure Survey, matched to the National Death Index for the years 1987 to 1992.	Authors classified study participants as "low," "intermediate," or "high" risk, depending on how generous their drug coverage was and, consequently, how likely they were to incur large out-of-pocket expenses.		Health outcome: mortality. People at intermediate risk had 1.2 times higher mortality than low-risk group, and people at high risk had 1.4 times higher mortality. After 5 years, 18.5% of persons at low risk for out-of-pocket expenditures, 22.5% at intermediate risk, and 22.6% of those at high risk had died.	Pathway of causation not clear (e.g., those in the high-risk group spent only 20% more out of pocket than the low-risk group, and had total Medicare spending of only 13% less). Although authors controlled for many factors including an attitudinal scale, there is still potential that omitted variables correlated with both mortality and the depth of supplemental coverage.

(continued)



TABLE 1A (continued)

<i>Citation</i>	<i>Sample/Data Source</i>	<i>Cost-Sharing Arrangement</i>	<i>Impact on Service Use</i>	<i>Health Outcome</i>	<i>Study Limitations</i>
Lichtenberg (2002, 27-52).	Sample size varies but is very large. National Hospital Discharge Survey, 1979 to 1992; National Ambulatory Medical Care Survey, 1973 to 1988; National Health Interview Survey, 1987 to 1991; various life tables.	The impact of becoming eligible for Medicare at 65 by measuring health utilization and outcomes just before and after age 65.	At age 65, increase of 2.8% per year in annual doctor visits per capita. Also an increase in inpatient use, but this seems to be due largely to putting off hospitalization in the previous years.	Health outcome: mortality. Medicare-induced increase in health care utilization leads to slower growth in probability of death after age 65; permanent or sustained 10% increase in number of doctor visits leads to 5% reduction in death rate; Medicare increased survival rate of elderly by about 13%.	Turning 65 is correlated with other factors, particularly retirement; no data provided about how health insurance coverage changes from ages pre-65 to post-65.

Prescription drugs  
Johnson et al.  
(1997, 103-22).

Between 3,352 and 3,981 enrollees in each of two Medicare HMO groups in each of the 4 years of this study, 1987 to 1991. Kaiser Permanente Northwest Division administrative and claims data.	In one group, an increase in copayments of \$1 to \$3 from 1987 to 1988, and from \$3 to \$5 from 1988 to 1989, where it remained through 1991. In the other group, copay insurance remained at 50% with a \$25 maximum per dispensing from 1987 to 1989, rising to 70% with a \$30 maximum in 1990, where it remained in 1991.	Inconsistent results. However, from 1989 to 1990, when the largest increase in copayment occurred, beneficiaries were less likely to get exposure to three essential classes of medication and two nonessential classes and the total days of use declined in five of the seven essential classes and one nonessential class.	Health outcome: Health status score declined in two of the three nonbaseline years, while it remained unchanged in the fourth year when cost-sharing arrangements remained unchanged.	Based on the existence of a single HMO; selection bias could affect results since members were not randomly assigned to the two groups; authors state that their "health status measure was not a validated one, and it was not possible to interpret the direction of change if not the magnitude of change in health status" (p. 119).
Kennedy and Erb (2002, 1120-24).	11,272 elderly respondents with disabilities in the Disability Follow-Back survey (supplement to the 1994 and 1995 National Health Interview Surveys).	Assessed the impact of out-of-pocket costs on appropriate drug use and associated health outcomes.	2% of adults 65 years old to 74 years old and 1% of adults 75-plus reported noncompliance due to cost. (These rates were much lower, however, than those of the younger age groups.)	Single measure of noncompliance, and not verified; not possible to make causal inferences based on study design; noncompliance might be much higher now among the 65-plus population due to much higher costs than in 1994 to 1995.
			Health outcomes: pain, increased severity of condition for which medication was prescribed, and so forth. In the entire sample (all ages), more than 50% of those who reported noncompliance due to costs reported adverse health outcomes.	

TABLE 1B Health Outcomes Measured Directly: No Effect, Inconsistent Effect, or Positive Effect on Health Outcome

<i>Citation</i>	<i>Sample/Data Source</i>	<i>Cost-Sharing Arrangement</i>	<i>Impact on Service Use</i>	<i>Health Outcome</i>	<i>Study Limitations</i>
Services Magid et al. (1997, 1772-29).	840 elderly in a total sample of 1,331 HMO enrollees. Ambulance and hospital records; census data.	Insurance copayments for emergency department care, which varied from \$0 to \$100.	No statistically significant delay in seeking care for myocardial infarction between no-copay and copay groups in sample taken (153 minutes for no-copay group; 149 minutes for copay group).	Health outcomes: in-hospital fatalities, long-term survival. No statistically significant impact on health outcomes among elderly: in-hospital fatalities (5.2% copay versus 6.3% no copay); long-term survival adjusted for sociodemographic characteristics similar for both groups (1.05 relative risk of death for copayment group).	Examined delays only among those who sought care in the emergency room (i.e., does not examine those who were dissuaded from seeking care); examines only myocardial infarction, while copays could affect use of other services more; data from a single HMO.

Prescription drugs Pilot et al. (2002, 246-52).	Quebec, Canada. Administrative data for 22,066 patients 65-plus who experi- enced acute myo- cardial infarction between 1994 and 1998.	Prior to 1996, elderly had to pay \$2 per prescription, with the new plan, bene- ficiaries will have to pay between \$200 and \$750 per year, depending on income.	Use of b-blockers, ACE inhibitors, and lipid-lowering drugs did not change as a result of increased copy- ment, regardless of sex or socioeco- nomic status. No within-class shift from more to less expensive drugs. Rates of readmission for complications, individual physi- cian or emergency room visits did not change.	Health outcome: mor- tality rate. Mortality rate did not change.	No other province served as control group (pre-post de- sign within Que- bec); results only apply to use of pre- scriptions after a myocardial infar- ction; response to copayments could differ for other ailments.
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(continued)

TABLE 1B (continued)

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Citation	Sample/Data Source	Cost-Sharing Arrangement	Impact on Service Use	Health Outcome	Study Limitations
Schneeweiss, Walker, et al. (2002, 822-29). <sup>a</sup>	British Columbia, Canada Administrative data for 37,362 elderly patients who received a higher priced ACE inhibitor (i.e., subject to cost-sharing) between December 1995 and March 1996 and were not using medications to treat asthma or diabetes.	Reference pricing for costlier ACE inhibitors (e.g., benazepril, cilazapril); covered up to \$27; patient paid \$2 to \$62 per month to make up the difference. Least expensive ACE inhibitors remained free; exemptions allowed for "frail elderly patients," previous treatment failure, diabetes, and asthmatics.	5,353 patients (18%) switched to a no-cost ACE inhibitor (so-called switchers); 37,362 so-called nonswitchers (39% were exempt from cost-sharing); 1,015 stopped antihypertensive therapy; 3,056 switched to other antihypertensive medications. Temporary increase in physician visits for switchers that leveled off 3 months after policy change. Statistically insignificant increase in hospital/ER admissions. Probability of discontinuing antihypertensive therapy was lower after the policy change than before.	Health outcome: monthly mortality rate. Monthly mortality rate for the entire sample did not change.	No other province served as control (pre-post design within British Columbia); results may not apply to other drugs that have higher within-class variability; almost 40% of nonswitchers received individual exemptions as "frail elderly patients" and results may not be generalizable to systems that do not provide similarly generous exemptions.

a. Schneeweiss, Soumerai, et al. (2002) was not included in this review because it was so similar to Schneeweiss, Walker, et al. (2002).

expenditures, and determined how that affected mortality. Controlling for a variety of demographic and health status measures, the study found that those at a higher cost risk (i.e., with less generous or no supplemental coverage) were more likely to die, with hazard rates about 20 percent higher for the intermediate-risk cost group (compared to the low-risk group), and 40 percent greater for the high-risk cost group.

As noted, 2 of the 3 studies with contrary findings were specific to those experiencing myocardial infarction (MI). Magid et al. (1997) examined seniors in a single health maintenance organization (HMO), some of whom had to pay more for emergency department care than others. The other (Pilote et al. 2002) used a much broader sample of seniors in Quebec who had experienced an MI over a several-year period. During this time, a \$2 copayment for prescription drugs was introduced where previously prescription drugs were free for elderly individuals. (Details on the change in copayment are provided later in this article.) Neither study found any significant mortality effects. One likely reason is that treatment for MIs is not considered discretionary, so patients experiencing MIs are not as put off by cost-sharing than others might be.

The third study examined reference pricing for ACE inhibitors in British Columbia, which was introduced in 1997. As a result of this policy change, the least expensive ACE inhibitors (captopril, quinapril, and ramipril) remained free of charge. However, costlier ACE inhibitors (benzapril, cilazapril, enalapril, fosinopril, lisinopril) were covered up to \$27, and patients who used them were required to pay between \$2 and \$62 per month to make up the difference in cost. Exemptions were granted for individuals who were considered frail elderly, who had previous failure of treatment, or who had certain chronic diseases such as diabetes or asthma. Schneeweiss, Walker, et al. (2002) found that 18 percent of elderly patients using ACE inhibitors switched to the cheaper alternatives. More than 1,000 patients discontinued antihypertensive therapy altogether, and 4,071 patients switched to other forms of antihypertensives; however, the probability of discontinuation was lower after the policy change than before. Physician visits increased temporarily among so-called switchers; however, 3 months after the policy change, physician visits among switchers and nonswitchers were similar. There were no statistically significant increases in hospital and emergency department admissions, and the adjusted monthly mortality rates did not change after policy implementation.

The remaining 2 studies examined health outcomes other than mortality. Johnson et al. (1997) created a health status measure based on two validated health status instruments, finding that individuals in the Medicare HMOs studied had lower reported health status after prescription drug copayments increased. Kennedy and Erb (2002) examined self-reported pain, increased

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severity of a condition, and a number of other medical experiences. The authors found these effects to be greater among individuals who reported that they did not comply with physicians' medication recommendations because of high costs.

One needs to be cautious in drawing conclusions from this limited number of disparate studies. Nevertheless, we do see from the small number of studies reviewed that cost-sharing can result in lower health status (either higher mortality or various measures of morbidity), with the following two notable exceptions.

The first exception is where generous provisions are in place to protect vulnerable populations from incurring undue financial risk as a result of cost-sharing. Nearly 40 percent of the nonswitchers in the Schneeweiss, Walker, et al. (2002) study were granted individual exemptions as "frail elderly patients" and were thus able to continue use of the costlier ACE inhibitors for no charge. Exemptions were also granted for individuals with certain chronic conditions and for individuals who were unable to manage their hypertension without the costlier ACE inhibitors. Schneeweiss, Walker et al. also note that ACE inhibitors have low within-class variability. For drug classes with higher within-class variability, therefore, increased cost-sharing could very well result in adverse health effects if it induces patients to switch to drugs that are less effective for them because of pharmacologic differences between the various drugs in that class.

The second exception is in the case of patients experiencing MIs. It may be that patients who have had an MI or other serious medical event realize the necessity of receiving recommended medical care irrespective of cost-sharing requirements. Both the Pilote and Magid studies note that myocardial infarction may be a condition widely recognized as an emergency—that is, a condition for which patients are likely to get treatment regardless of cost. Selby, Fireman, and Swain (1996), for example, found that increased copayments led to a decrease in emergency department use in a nonelderly population, except for those conditions that were recognized by patients as being "always an emergency." Thus, for conditions other than MI, cost-sharing appears to present a barrier that can impair health status.

#### THE EFFECT OF COST-SHARING ON THE APPROPRIATE USE OF CARE BY SENIORS

The remaining 15 studies do not examine health status *per se*, but rather, how cost-sharing affects the use of services or medications that are thought to improve health status (see Table 2A and Table 2B). We call this the "appropriate"

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TABLE 2A Appropriateness of Service or Medication Use Associated with Cost-Sharing: Negative Effects on Appropriate Service or Medication Use

<i>Citation</i>	<i>Sample/Data Source</i>	<i>Cost-Sharing Arrangement</i>	<i>Inappropriate Use Associated with Cost-Sharing</i>	<i>Study Limitations</i>
Services Blustein (1995, 1138-43).	4,110 female Medicare beneficiaries. Medicare bills for 1991 and 1992 and Medicare Current Beneficiary Survey for those years.	Medicare only versus Medicare + supplemental insurance on preventive services (mammography).	Inappropriate use: failing to obtain mammography an effective tool for early breast cancer detection, at recommended rates. Individuals without supplemental coverage were less likely to obtain a mammogram. Odds ratios of having a mammogram were 3.03 for those with employer-sponsored coverage, 2.97 for self-purchased coverage, and 1.99 for Medicaid compared to those with Medicare only.	Cross-section study; potential that factors not controlled for would affect both receipt of mammogram and type of insurance owned, biasing results; study period was when Medicare first introduced mammogram benefit, so some people may not have known; study misses mammograms not billed to Medicare.

(continued)



TABLE 2A (continued)

<i>Citation</i>	<i>Sample/Data Source</i>	<i>Cost-Sharing Arrangement</i>	<i>Inappropriate Use Associated with Cost-Sharing</i>	<i>Study Limitations</i>
Prescription drugs Adams, Soumerai and Ross- Degnan (2001, Z76-86).	4,439 Medicare beneficiaries with hypertension, from the 1995 Medicare Current Beneficiary Survey.	Employer-sponsored versus state-sponsored versus private supplemental insurance.	Inappropriate use: reduced use of essential/effective medication due to cost. Seniors with some form of state-sponsored drug coverage were more likely to use antihypertensive medications (odds ratio = 1.5) than their counterparts with Medicare only. Among seniors with private supplemental insurance, those with employer-sponsored insurance were more likely to use antihypertensive medications (odds ratio = 1.3) than their counterparts with private insurance that does not cover medications.	Cross-sectional study; possible bias due to the endogeneity of supplemental insurance coverage, which was not controlled for in the analysis; applies to antihypertensive use only.

Balkrishnan et al. (2001, 1093-1100).	2,411 older adults continuously enrolled in Medicare HMO since 1998 (to test the 1999 policy before and after effects); 259 enrolled since 1997 were eligible for first part of the study (to test the 1998 policy before and after effects).	Initial arrangement in 1997: \$500 annual coverage limit, \$6 per generic drug, \$12 per brand-name drug. Benefit changes in 1998: \$200 quarterly limit, \$7 per generic, \$15 per brand name. Benefit changes in 1999: unlimited coverage of generic drugs at \$5 per item, \$15 per brand-name drug up to \$25 per month.	Inappropriate use: reduction in medication use that is offset by increased use of other health services. Policy change in the first year (1998) resulted in 25.2% increase in annual inpatient admissions. Also resulted in a 125% increase in total number of different chronic medications, a 43.1% increase in total enrollee costs, a 29% increase in prescription costs and 38% increase in total costs for the HMO compared to the previous year. Policy change in second year (1999) resulted in a 27% decrease in prescription costs, 4.4% drop in physician visits, no significant changes in inpatient visits, and an overall 6.2% drop in annual total health care costs.	Limited to a single HMO; small sample for the initial policy change; no control group, so potential exists for other factors besides drug copayments being partly responsible for the changes over time that were observed.
		Unlimited generic drug coverage and limited brand-name drug coverage reduced total prescription costs but did not increase nonprescription related service use in the population.		

(continued)

TABLE 2A (continued)

<i>Citation</i>	<i>Sample/Data Source</i>	<i>Cost-Sharing Arrangement</i>	<i>Inappropriate Use Associated with Cost-Sharing</i>	<i>Study Limitations</i>
Blustein (2000, 219-30).	4,334 Medicare beneficiaries. 1995 Medicare Current Beneficiary Survey.	Drug coverage versus no drug coverage.	Inappropriate use: failure to purchase clinically effective medication prescribed by a health professional. Lack of drug coverage increased the odds of failing to purchase any antihypertensives by 40%. Drug coverage increased number of tablets purchased (37 more tablets).	The main independent variable, drug coverage, could be endogenous, and this was not controlled for in the analysis. In addition, the data set provides no information on the extent of drug coverage; self-reported data on drug coverage.
Cox et al. (2001, 296-301).	378 Medicare HMO risk enrollees in Arizona with capped prescription benefits who responded to a questionnaire.	Capped prescription benefits of \$1,500 per year (66.6% of the sample), \$3,000 per year (24% of sample), or \$750 per year (10% of sample).	Inappropriate use: noncompliance due to costs. To reduce out-of-pocket charges, 15% responded they went without necessities, and 12% borrowed money to pay for their prescriptions. Those who reached their prescription cap were more likely to take less medication than prescribed (odds ratio = 2.8), and discontinue medication (odds ratio = 3.4) compared to those who had not reached their prescription cap.	Small sample, one geographic setting, nor is there an explicit control group.

Federman et al. (2001, 1732-39).	1,908 66-plus-year-old Medicare beneficia- ries with coronary heart disease, from the 1997 Medicare Current Beneficiary Survey.	Drug coverage versus no drug coverage. No drug coverage. (Medicare FFS only; Medicare FFS with Medigap without drug coverage) ver- sus drug coverage (Medicaid; other public programs; Medigap with drug cover; HMO plans; employer sponsored plans).	Inappropriate use: failure to use/ purchase clinically effective medication. Patients without drug coverage were less likely to use statins and nitrates than patients with drug coverage. Patients with Medicare only were less likely to use statins (odds ratio = 0.2). Patients with Medicare only or Medigap without drug cover- age were less likely to use ni- trates (odds ratios = 0.6 and 0.71, respectively). Patients with Medicaid were the only group less likely to use $\beta$ - blockers (odds ratio = 0.6) than those with employer-spon- sored coverage.	The main independent variable, drug coverage, could be en- dogenous, and this was not controlled for in the analysis; the data set provides no infor- mation on the extent of drug coverage; self-reported data on drug coverage.
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(continued)

TABLE 2A (continued)

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Citation	Sample/Data Source	Cost-Sharing Arrangement	Inappropriate Use Associated with Cost-Sharing	Study Limitations
Safran et al. (2002, W253-68).	10,416 Medicare beneficiaries in eight states who responded to a 2001 survey.	Examined the effect of different types of prescription drug coverage (including no coverage) on out-of-pocket spending and drug utilization.	<p>Inappropriate use: noncompliance with a prescribed regimen or spending less on other basic necessities.</p> <p>Those without drug coverage were more likely to report non-compliance than patients with drug coverage. Patients without drug coverage were 2.8 times less likely to fill one or more prescriptions due to costs, 2.5 times more likely to skip doses to make drugs last longer, and 2.3 times more likely to spend less on basic necessities to afford medication.</p> <p>Among low-income seniors, having drug coverage improved compliance, but the type of drug coverage made a difference; 25% of low-income seniors with Medigap or HMO drug coverage reported not filling prescriptions, and &gt; 20% skipped doses, coinciding with higher monthly out-of-pocket spending, compared to those with Medicaid, employer-sponsored, or VA coverage.</p>	Insurance coverage variable may be endogenous, and this was not controlled for in the analysis; self-reported data on drug coverage.

Soumerai et al. (1991, 1072-77).	60-plus-year-old white, chronically ill individuals taking an average of 3-plus drugs per month; Medicaid. Sample size = 411 in New Hampshire and 1,375 in New Jersey. 36 months of Medicaid claims data.	New Hampshire (ex- perimental group): three-drug payment limit (during months 15-25); cap replaced with \$1 copayment per pre- scription (months 26-36 in 36-month study period). New Jersey (control group = no patient cost-sharing requirement).	Inappropriate use: reduced use of essential/clinically effective medications; increased use of other health services to offset reduced use of medication. Nursing home admissions in- creased from 2.3% to 10.6% (14.4% for sicker patients) after the drug limit was introduced. But ex- cess risk of new admissions to nursing homes ceased once the cap was lifted. In New Jersey, nursing home admissions in- creased from 2.1% to 6.6%. Use of essential medication dropped by 35% in New Hampshire after drug cap was introduced but returned to baseline levels after cap was lifted. In New Jersey, there was no change in medication use.	Relatively small sample in New Hampshire, the experimental state. Lack of control variables could confound results if there were unrelated factors that af- fected nursing home admis- sions in New Hampshire rela- tive to New Jersey in months 15 to 25 of the study. (Because of relatively strong study de- sign, no other variables were controlled for.)
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(continued)

TABLE 2A (continued)

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<i>Citation</i>	<i>Sample/Data Source</i>	<i>Cost-Sharing Arrangement</i>	<i>Inappropriate Use Associated with Cost-Sharing</i>	<i>Study Limitations</i>
Steinmen, Sands, and Covinsky (2001, 793-99).	4,896 70-plus-year-olds who regularly used prescription drugs. 1995 to 1996 Survey of Asset and Health Dynamics Among the Oldest Old.	No prescription coverage versus partial versus full.	Inappropriate use: noncompliance to a prescribed regimen due to costs. Generosity of coverage was found to be linked to noncompliance. Whereas only 2% of individuals with full coverage reported noncompliance, 3% of individuals with partial coverage and 7.7% of individuals with no drug coverage reported noncompliance. Among those with no coverage, noncompliance was more likely among ethnic minorities, those with low incomes, and those with high out-of-pocket costs.	Insurance coverage variable may be endogenous, and this was not controlled for in the analysis; self-reported data on drug coverage.
Stuart and Grana (1998, 202-11).	A random mailed survey of 4,066 elderly Pennsylvania Medicare beneficiaries who responded to a 1990 survey.	Medicare only versus Medicare + supplemental insurance.	Inappropriate use: treating serious conditions with over-the-counter medicine or not treating the condition at all, when a prescription medication is indicated. Having prescription drug coverage significantly increased the odds of prescription treatment for 10 of the 22 conditions examined, including serious conditions such as diabetes (odds ratio = 1.7) and swelling of ankles and legs (odds ratio = 1.5).	Study from a single state; cross-sectional study, although endogeneity of insurance coverage was tested and rejected.

Stuart and Zacker (1999, 201-12):	1,302 Medicare beneficiaries with Medicaid, from the 1992 Medicare Current Beneficiary Survey; compilation of Medicaid program characteristics from National Pharmaceutical Council.	States with and without Medicaid prescription drug copayment	<p>Inappropriate use: reductions in medication use that are linked to lower self-reported health status.</p> <p>Medicaid recipients in copay states reported filling five fewer prescriptions annually (19.6) compared to those in non-copay states (24.6 prescriptions per year); regression analysis shows that 75% of this difference is attributable to copay policies.</p> <p>Copay recipients in fair health reported nearly 40% fewer prescriptions than did their counterparts in noncopay states.</p> <p>Copay recipients in poor health reported nearly 27% fewer prescriptions than did their counterparts in noncopay states.</p>	Limited to sample of Medicaid beneficiaries; cross-sectional study with limited number of control variables for health status.
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(continued)



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TABLE 2A (continued)

Citation	Sample/Data Source	Cost-Sharing Arrangement	Inappropriate Use Associated with Cost-Sharing	Study Limitations
Tamblyn et al. (2001, 421-29). <sup>a</sup>	Canada. Quebec; 117,408 elderly eligible for cost-sharing; 93,950 elderly used prescription medication in the prepolicy year; 70,801 elderly used essential drugs (75.3% of total elderly sample).	Prereform: elderly paid \$2 per prescription, up to a \$100 annual out-of-pocket maximum. Postreform: elderly paid 25% on prescription costs up to annual income-indexed maximum, of \$200, \$500, or \$750 after a \$100 annual deductible.	Inappropriate use: reduction in use of essential/effective medication; adverse events associated with reduction of essential/effective medication. 9.1% reduction in essential drug use which was associated with a net increase of 6.8 adverse events (i.e., hospitalization, long-term care admission, death) per 10,000 per month. Moreover, the rate of adverse events was higher the greater the drug reduction: 256 adverse events (per 10,000 person-months) in the no-reduction cohort, versus 272 and 385 for those with minor ( $\leq 0.1$ to 0.5 drugs per day) and major ( $\geq 1$ drugs per day) reductions. The authors also found a net rate increase of 14.2 per 10,000 of monthly emergency department visits related to reductions in drug use.	No other province served as control group (pre-post design within Quebec); no direct confirmation that increase in adverse events was caused by reduction in use of essential drugs; did not examine individual patients but rather, aggregate rates over time.

a. Tamblyn (2001) was not included in this review because it was so similar to Tamblyn et al. (2001).

TABLE 2B Appropriateness of Service or Medication Use Associated with Cost-Sharing: Positive or No Effect on Appropriate Service or Medication Use

Citation	Sample/Data Source	Cost-Sharing Arrangement	Inappropriate Use Associated with Cost-Sharing	Study Limitations
Services Culler, Parchman, and Przybylski (1998, 804-17).	8,598 Medicare beneficiaries in 1991, from the 1991 Current Medicare Beneficiary Survey.	Medicare only versus Medicare + Medicaid versus Medicare + supplemental insurance.	Inappropriate use: potentially preventable hospitalizations. People with Medicare only were the least likely to have a potentially preventable hospitalization (odds ratio = 0.68 compared to those with supplemental insurance; odds ratio = 0.88 compared to those with Medicaid).	Cross-section study, making it difficult to control for other factors that increase hospitalization rates; although it found that supplemental insurance led to more preventable hospitalizations, it did not examine whether such insurance also led to a greater likelihood of being hospitalized for a medically necessary service.
Ho et al. (2002, 381-87).	3,423 elderly Medicare patients admitted with myocardial infarction at one of 19 Seattle hospitals, 1989 to 1993 Myocardial Infarction Triage and Intervention data.	Medicare only versus Medicare supplemental insurance (employer-sponsored or individually purchased).	Inappropriate use: delay in seeking care for acute myocardial infarction. No statistically significant delay in seeking care for myocardial infarction between Medicare only group and Medicare + Private Supplemental Insurance group (135 minutes for Medicare care only group, 130 minutes for Medicare + Supplemental Insurance group).	Examined delays only among those who sought care in the emergency room (i.e., does not examine those who were dissuaded from seeking care); examines only myocardial infarction, while supplemental insurance could affect use of other services more.

(continued)

TABLE 2B (continued)

<i>Citation</i>	<i>Sample/Data Source</i>	<i>Cost-Sharing Arrangement</i>	<i>Inappropriate Use Associated with Cost-Sharing</i>	<i>Study Limitations</i>
Prescription drugs Blais et al. (2001, 410-14).	Quebec, Canada. Administrative data from 233,451 ran- domly selected users of nitrates, antihypertensive agents, and benzo- diazepines, 4 years before versus 13 months after the increase in copayments.	Prereform: elderly paid \$2 per pre- scription, up to a \$100 annual out-of- pocket maximum. Postreform: elderly paid 25% on pre- scription costs up to annual income- indexed maximum of \$200, \$500, or \$750, after a \$100 annual deductible.	Inappropriate use: reduction in use of essential/ effective medication. Nonstatistically significant de- crease in number of prescrip- tions for essential medications: nitrates (5.1%), antihyper- tensive agents (1.1%), and benzo- diazepines (0.8%).	No other province served as con- trol group (pre-post design within Quebec); results only apply to a few classes of drugs; very few control variables to capture other possible changes in demand or physician pre- scribing behavior over time.

use of services, and by it we mean whether patients are obtaining medications and/or services that are recommended either for preventive care or for the treatment of disease. We are not referring to the societal cost-effectiveness, however, but rather medical appropriateness. For each of the studies examined, we define a measure of "inappropriate use" in the 4th column of Table 2A and Table 2B.

A few examples include preventable hospitalizations, failure to receive recommended screening tests such as mammograms because of cost, and failure to receive blood pressure drugs for hypertension due to cost.

Table 2A provides information on the 12 studies finding a negative impact on appropriate utilization, and in Table 2B, the 3 studies that do not show such an effect. Just 3 of the studies examined services, with the remaining 12 analyzing prescription drug use. Generally speaking, our literature review strongly suggests that increased cost-sharing tends to reduce the appropriate use of prescription drugs and, somewhat less definitely due to fewer relevant studies, appropriate service usage.

We first discuss 2 studies that are perhaps prototypical of those finding that cost-sharing impedes the appropriate use of care: one examining drugs, and the other, preventive services. After that, we present some studies that are noteworthy because they were based on natural experiments about the impact of cost-sharing on service and/or drug utilization and associated health outcomes. One of these concerns changes in cost-sharing requirements for prescription drugs in Canada, and the other, cost-sharing under the Medicaid program.

*Prototypical studies.* Stuart and Grana's (1998) study findings indicate that Medicare beneficiaries with supplemental insurance were 6 percent to 17 percent more likely to use prescription drugs to treat their health problems than their counterparts with Medicare only, who were more likely to treat their health problems with over-the-counter drugs or not to treat them at all. Having supplemental insurance with drug coverage significantly increased the odds of prescription drug treatment for 10 of the 22 conditions examined by the authors, including serious conditions such as diabetes and leg or ankle swelling. Drug coverage alone, however, did not decrease the financial burden experienced by beneficiaries equally: independent of drug coverage, beneficiaries with annual incomes in the top quartile (> \$18,000) were 18 percent more likely to treat their health problems with prescription drugs than their counterparts with incomes below \$6,000. As such, the authors concluded that cost-sharing most acutely affected the consumption patterns of low-income seniors, especially those without drug coverage.

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Cost-sharing generally dampened demand for medical services as well. Blustein (1995), for example, found that 14.4 percent of women with Medicare only (i.e., no supplemental insurance) had a mammography, compared with 44.7 percent of women with employer-sponsored supplemental insurance, 40.1 percent with self-purchased supplemental insurance, and 23.9 percent with Medicaid supplemental insurance. These differences persisted in stratified and multivariate analyses.

*Increased cost-sharing in Quebec, Canada.* As noted earlier, the Canadian province of Quebec served as the site for a natural experiment to test the effect of patient cost-sharing on drug-utilization and health outcomes among seniors when, in August 1996, the provincial government introduced a deductible and a 25 percent coinsurance charge for prescription drugs. The deductible varied from \$0 to \$350 depending on income, and coinsurance payments were subject to an annual ceiling of \$200, \$500, or \$750, depending on income. Prior to August 1996, seniors were entitled to free prescription drugs except for a \$2 copayment per prescription up to a \$100 maximum. Copayments were waived for low-income seniors. We noted in a previous section that these changes in copayments did not appear to result in increased mortality for those who had experienced a myocardial infarction, nor did it affect the use of recommended cardiac-related drugs for these patients (Pilote et al. 2002).

An obvious question is whether the increase in drug copayments had impacts beyond individuals who had previously experienced a heart attack. Two such studies have been conducted, but they showed contradictory results. Tamblyn et al. (2001) conducted an interrupted time-series analysis of data from 32 months before and 17 months after cost-sharing was introduced to measure its impact on drug use. Separate prepolicy control and postpolicy cohorts were used to gauge the effect those changes had on the use of essential and less essential medications and certain health outcomes. The authors found that the use of essential drugs, such as insulin, ACE inhibitors, and  $\beta$ -blockers decreased by 9.1 percent in seniors, while use of less essential drugs decreased by 15.1 percent.

The rate of serious adverse events (i.e., first occurrence of acute care hospitalization, long-term care admission, or death) associated with a reduction in essential drug use increased from 5.8 per 10,000 person-months in the prepolicy control group to 12.6 in the postpolicy cohort. The rate of emergency department visits related to reductions in essential drugs also increased by 14.2. They also observed a direct relationship between the magnitude of the drug reduction and health outcome: the rate of serious adverse events in those with no reduction in essential drug use was 256 per 10,000 person-months, compared to 272 in those with a minor reduction ( $> 0.1$  to  $0.5$  drugs/day) and

385 in those with a major reduction ( $\geq 1$  drug/day). There was no increase in the rate of serious adverse events or emergency department visits associated with reductions in less-essential drug use.

Contrary to Tamblyn et al. (2001), Blais et al. (2001) found that the introduction of cost-sharing in Quebec did not affect prescription drug utilization or associated health outcomes among elderly patients. These authors tracked trends from 4 years before the increase in copayments, to 13 months afterwards. The sample included large numbers of patients (26,000 to 133,000) who were users of nitrates, antihypertensive agents, anticoagulants, and benzodiazepines. The first three types of drugs were examined because they tend to be useful for those with cardiovascular-related disease, whereas the last group tend to be less essential. The authors found that the Quebec drug policy produced no statistically significant changes in drug use among seniors, for either the essential or discretionary drugs they examined. All changes in drug use after the introduction were small and not statistically significant.

It is curious that the Tamblyn and Blais studies reached contradictory results in examining the same policy change. (In contrast, the Pilote et al.'s findings are easier to understand since they apply only to people who had experienced a myocardial infarction.) One explanation given by Blais et al. (2001) is that their study design did not allow them to detect any within-class switching to less expensive drugs that may have occurred. And while the authors found no change in essential drug use—and presumably, therefore, no adverse health effects—they note that their study design did not enable them to verify whether the continued drug use they observed did not, in fact, come “at the expense of essential foods or psychosocially important leisure activities.” Indeed, Safran et al. (2002) and Cox et al. (2001) have found that seniors do spend less on basic necessities to purchase needed medications.

Another possible reason is the difference in the drugs examined. Whereas the “essential” drugs examined by Blais et al. (2001) are mainly for cardiac care, Tamblyn et al. (2001) examine drugs used for treating a variety of illnesses—not only cardiac disease but also antiviral medication, thyroid drugs, antidepressants, anti-Parkinsonian drugs, inhaled steroids—among many others. Thus, one possible interpretation of the conflicting results is that patients with cardiac problems do not stint on using recommended medications, perhaps because of the life-threatening nature of their illness. In contrast, those with other conditions may indeed be more price sensitive in the wake of copayment increases.

*Medicaid drug payment limits.* Soumerai et al. (1991) examined the effect of drug payment limits—or “caps”—on drug use and admission to hospitals

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and nursing homes<sup>6</sup> within the Medicaid program. These caps can increase patient cost-sharing by shifting the financial burden of prescription medications or services in excess of the cap onto the patient. Caps can be instituted in the form either of a monetary value (e.g., an annual maximum of \$1,500) or of a specified per-person quantity of medications or services (e.g., three drugs per person per month) beyond which the insurer will not reimburse the patient. As seniors (especially those who are chronically ill) tend to be among the heaviest users of prescription medications and services, they are potentially rendered particularly vulnerable to any utilization or health effects these payment limits might incur. In this study, Soumerai et al. (1991) were interested in finding out whether prescription drug payment limits resulted in reductions in the use of essential medications and, subsequently, increased admissions to nursing homes and hospitals. Toward this end, the authors analyzed 36 months of Medicaid claims data from New Jersey, a state without any drug payment limits, and compared them with equivalent data from New Hampshire—a state in which a three-drug per person limit was in operation for 11 of the 36 months (months 15-25). The payment cap was eventually repealed and replaced with a \$1 copayment per prescription beginning in the 26th month of the 36 month study period.

Soumerai et al. (1991) found that drug use remained unchanged in New Jersey throughout the study period. In New Hampshire, however, drug use dropped by 35 percent to 1.9 standardized monthly doses per patient per month after the cap was instituted. Once the payment limit was lifted, drug use rose almost to baseline levels.

At the beginning of the study period, both New Jersey and New Hampshire had similar proportions of Medicare beneficiaries entering nursing homes: 2.3 percent in New Hampshire and 2.1 percent in New Jersey. By the end of the 11-month period in which the payment cap was in place, however, 10.6 percent of the New Hampshire patients were admitted into nursing homes, compared to 6.6 percent of New Jersey patients. After the payment cap was repealed, the use of core drugs returned to precap levels, as did the so-called excess risk of new admissions to nursing homes. Furthermore, the authors found that nursing home stays tended to be long term. About a third of the patients who entered nursing homes just before or during the cap period stayed for 6 months or less, while 57 percent stayed for 1 year or more. Ninety percent of the long-term residents were still in nursing homes at the end of the study period. Excess risk of admission to nursing homes was even larger for sicker patients. More than 14 percent of New Hampshire patients regularly taking three or more classes of drugs were admitted to nursing homes, compared to 6.2 percent of New Jersey patients. There were, however, no significant differences in admission rates between New Hampshire and New Jersey patients



taking less than three classes of medications. The authors suggest this is evidence that the burden of increased cost-sharing fell disproportionately on the patients who were most disabled. In contrast to nursing home admissions, hospital admissions remained unchanged in both New Jersey and New Hampshire.

Schultz and Lewis (1992) question Soumerai et al.'s (1991) findings, noting for example that their sample included individuals eligible for Medicaid who were under 65 years of age, whose eligibility may de facto signal a higher risk of institutionalization independent of increased cost-sharing. Yet data were not reported by Soumerai et al. on what proportion of the sample these individuals comprised, nor was analysis undertaken on the effect of age of admission rates. They also note that because of the relatively small experimental sample ( $n = 411$ , New Hampshire), "had 17 fewer admissions occurred in New Hampshire, the admissions rates between the two states would have been identical." As such, the percentages of increased nursing home admissions may constitute, therefore, insufficient data from which to draw any firm conclusions.

#### IMPACT OF DIFFERENT KINDS OF COST-SHARING

As indicated from the preceding review, different researchers have used different approaches to examine cost-sharing. One method has been to compare those who have supplemental insurance or different types of such coverage with those who do not have Medicare supplementation. The second method is to look at cost-sharing directly through the study of increased copayments. This section compares the results of these two types of studies.

*Effect of supplemental insurance.* Our findings indicate that having some form of supplemental insurance is associated with more appropriate health care use, particularly when such supplemental insurance provides coverage for prescription medication. Nine studies (Adams, Soumerai, and Ross-Degnan 2001; Blustein 1995, 2000; Culler, Parchman, and Przybylski 1998; Federman et al. 2001; Ho et al. 2002; Safran et al. 2002; Steinman, Sands, and Covinsky 2001; Stuart and Grana 1998) examined the effect of having supplemental insurance (compared to having Medicare only) on appropriate health care use. In only two studies did seniors with just Medicare coverage fare just as well as—or better than—seniors with supplemental insurance: Culler, Parchman, and Przybylski (1998) found that those with Medicare only were the least likely to have a potentially preventable hospitalization, with an odds ratio of 0.7 compared to those with supplemental insurance. Ho et al. (2002) found no statistically significant delay in seeking care at an emergency depart-



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ment for a heart attack between Medicare beneficiaries with and without private supplemental insurance.<sup>7</sup>

In the other seven of the nine studies, inappropriate health care use was found to be associated with lack of supplemental insurance. For example, in multivariate analysis (which controlled for demographics, self-assessment health status and number of medical conditions, among other variables), Blustein (2000) found that lack of drug coverage increased the odds of failing to purchase any antihypertensives by 40 percent. Steinman, Sands, and Covinsky (2001) found that close to 8 percent of seniors without drug coverage restricted their use of necessary medications because of cost, compared to 2 percent of seniors with full coverage and 3 percent of seniors with partial coverage. Similarly, Safran et al. (2002) found that seniors with no drug coverage were more likely than their counterparts with coverage to skip doses to make their medications last longer, to spend less on basic necessities to help pay for their medications, and to not fill one or more prescriptions due to costs (odds ratios of 2.5, 2.3, and 2.8, respectively).

In addition to having supplemental insurance, our findings suggest that the type of supplemental insurance seniors have may also affect the appropriateness of their health care use. As noted earlier, Blustein (1995) found that women with employer-sponsored coverage were most likely to have a mammogram. The odds ratios of having a mammogram were 3.03 for those with employer-sponsored coverage, 2.97 for those with self-purchased coverage, and 1.99 for those with Medicaid compared to those with Medicare only. Safran et al. (2002) found that among low-income seniors, more than 20 percent of those with Medicare HMO or Medigap coverage benefits skipped doses or reported not filling prescriptions compared to those with Medicaid, employer-sponsored, or Veterans Administration coverage. The authors note that this coincides with higher monthly out-of-pocket spending for low-income seniors with Medicare HMO or Medigap benefits.

*Direct effect of cost-sharing.* While informative, studies about the impact of having supplemental insurance on patient behavior capture the effects of cost-sharing only indirectly, in that the possession of supplemental insurance tends to reduce cost-sharing in varying degrees. Another, perhaps more precise, way of assessing the effects of cost-sharing on patient behavior is to look at cost-sharing directly. Toward this end, nine studies examined the effect of specific cost-sharing mechanisms on health outcomes and/or appropriate healthcare use. Two examined the effect of payment caps (Cox et al. 2001; Soumerai et al. 1991) and seven examined the effect of copayments. (Balkrishnan et al. 2001; Blais et al. 2001; Johnson et al. 1997; Magid et al. 1997; Pilote et al. 2002; Stuart and Zacker 1999; Tamblyn et al. 2001).

Payment caps appear to lead to inappropriately low service usage. In Cox et al. (2001), for example, seniors were subject to an annual pharmacy benefit of \$750 or \$1,500 depending on whether they lived in rural or urban counties, respectively. Seniors in urban counties were able to opt into a \$3,000 maximum benefit policy by paying a higher premium. Close to 40 percent of the sample obtained samples from physicians to avoid reaching or exceeding their annual benefit limit, while 16 percent took less than prescribed amounts, 15 percent went without basic necessities, and 12 percent borrowed money to pay for their prescriptions. In logistic regression, those reaching the payment cap were more than twice as likely to engage in any one of these cost-saving measures compared to their counterparts who had not reached their cap.

With regard to the effect of copayments, the findings are more mixed. Of the seven studies that examined copayments, four suggest that they resulted in inappropriate health care usage (Balkrishnan et al. 2001; Johnson et al. 1997; Stuart and Zacker 1999; Tamblyn et al. 2001), while three found that copayments had no statistically significant (Magid et al. 1997; Blais et al. 2001; Pilote et al. 2002). Whereas Johnson et al. (1997), for example, found that small increases in copayments did not substantially affect health outcomes, the authors found that seniors were less likely to get exposure to three essential classes of medication during the phase of their study when the largest increase in copayments occurred. Total days of use also declined in five of the seven essential classes of medication during that period. Similarly, Stuart and Zacker (1999) found that seniors in fair or poor health who resided in states with Medicaid copayments reported 27 percent to 40 percent fewer prescriptions than their counterparts in noncopay states. Contrary to Johnson et al. (1997) and Stuart and Zacker (1999), however, Magid et al. (1997) found that seniors facing emergency department copayments suffered a 5.2 percent in-hospital fatality rate compared to those with no copayments (6.3 percent). While the difference was not statistically significant, it is interesting to note that the no-copayment cohort experienced the higher in-hospital fatality rate.

### POLICY IMPLICATIONS

One should be careful in drawing strong policy conclusions from this review of the literature on seniors and cost-sharing because of several limitations. First, nearly all of the studies are based on analyses of cross-sectional data. In such cases, it is difficult to draw strong causal inferences because of inherent problems in controlling for all confounding variables. Moreover, almost none of the studies that used health insurance coverage as a proxy for cost-sharing liability attempted to control for potential endogeneity. That is to say, it is possible that sicker people have difficulty in securing affordable

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insurance (particularly with drug benefits), but this might be interpreted as lack of benefits causing people to be sicker. Second, most studies relied on self-reported data on both health status as well as insurance coverage. Third, many studies examined health status indirectly (e.g., patients used fewer drugs that medical experts believe are necessary) rather than securing data on actual health outcomes that result from high cost-sharing. Finally, only a few studies have been conducted on cost-sharing for services (as opposed to pharmaceuticals), making any resulting conclusions particularly tentative.

In a review of 22 studies meeting our selection criteria, it is difficult to rank them according to the strengths of their study designs. None was based on a true experiment. The individual studies that are perhaps most convincing are those based on natural experiments, and we emphasized those in the text. In addition, those studies that focus on cost-sharing directly rather than indirectly (using supplemental insurance as a proxy) also should carry more weight. Nevertheless, some weight needs to be attached to the fact that nearly all of the studies of supplemental insurance that rely on cross-sectional data reach similar conclusions that cost-sharing impedes the appropriate use of services or health status, particularly with respect to prescription drugs.

Further strengthening this conclusion is that 3 of the studies that failed to reach such a conclusion focused on myocardial infarction, a service that may not be representative since it is a life-threatening emergency. Thus, with the exception of myocardial infarction, there is near unanimity among the studies that cost-sharing has a negative effect on the appropriate use of services or health status of seniors.

Keeping these limitations in mind, what do these results imply for public policy? On the prescription drug side, the findings suggest a Medicare drug benefit, such as the one recently signed into law, would lead to greater use of recommended medications. But this legislation does not take advantage of current knowledge about which sorts of patients are likely to obtain the greatest health benefit from a particular type of drug. Rather, cost-sharing requirements are the same for all individuals and all medications. A more effective policy has been suggested by Fendrick and colleagues (2001), who argue for a system of "benefit-based copays," in which the amount of patient cost-sharing would be based (inversely) on expected clinical benefits. The authors argue that this would be determined by "the benefit a patient would receive from a specific drug as determined from the available scientific evidence, relative to the total cost of treatment" (p. 862). It could potentially be applied in areas in which there is strong clinical evidence about what constitutes appropriate treatment; an example the authors provide is for cholesterol reduction. Needless to say, adopting this cost-sharing system—which is tailored to each individual patient—would face major administrative challenges. Nevertheless, it

provides an example of how policy makers can strive to fine tune cost-sharing to enhance cost-savings and potentially improve clinical outcomes, as scientific research and information systems continue to improve.

On the services side, the majority of studies examined imply that lower cost-sharing through possession of supplemental insurance can also benefit seniors. In this realm, policy makers have fewer levers available, but one is to increase coverage for the near-poor. It is estimated that nearly half of those eligible for the Qualified Medicare Beneficiary and Specialized Low-Income Medicare Beneficiary programs have not enrolled (Families USA 1998). Better outreach and education is necessary so that individuals already eligible for coverage will indeed enroll.

Clearly, additional research is necessary to adequately address the issue. To the extent possible, it would be most helpful if future research were able to deal with some of the data and methodology problems that past researchers have faced. In particular, it would be helpful to have: more studies that follow individuals over time rather than keying in on variation among individuals at a particular point in time; the use of clinical and/or administrative data to measure health status, rather than relying on self-assessments; and more effort put into coming up with adequate statistical instruments for insurance coverage to deal with problems of endogeneity. Improvements such as these will provide a clearer picture as to how cost-sharing affects the kinds of services used by seniors and their impact on health, and with it, a clearer idea of appropriate public policy initiatives.

## NOTES

1. Another factor affecting price responsiveness is the time frame being considered. In general, goods show high price responsiveness in the very short run because often a consumer has no alternative. Over time, however, it is possible to plan for the fact that the prices of certain goods have increased. We do not explore this issue in the text because it is likely to affect seniors and nonseniors in a similar way.
2. Some have criticized the study's categorization of services by medical effectiveness. Feldman and Dowd (1993) note one example of a potential problem: medical care is considered to be highly effective for the treatment of strep throat, but rarely effective for throat pain (although self-care is effective). Others have indicated that it seems odd to include chest pain in the category in which medical care is rarely effective.
3. Tamblyn (2001) was not included in this review because it was so similar to Tamblyn et al. (2001). Schneeweiss, Soumerai, et al. (2002) was not included in this review because it was so similar to Schneeweiss, Walker, et al. (2002).
4. Tamblyn et al. (2001) also included mortality as an outcome measure. However, because this study lumped death into a single "adverse events" category (along with

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hospitalization and long-term care admission), it was not included among those studies that specifically looked at mortality in isolation.

5. Drug noncompliance was considered to imply a negative health outcome if the drug in question was prescribed by a physician (and presumably, therein, medically necessary) or if it was identified by the authors as an "essential" or "core" drug whose health benefit has been demonstrated in clinical studies.
6. Soumerai et al. (1991) note that nursing home admissions data were not available for this study. Therefore, it was not possible to distinguish whether increased admissions to nursing homes were because of declining health or the desire to maintain the use of essential medications in the wake of the drug payment caps. For purposes of this study, therefore, increased admissions rates were not in themselves considered evidence of an adverse health outcome.
7. Medicare beneficiaries with Medicare HMO coverage or with Medicaid coverage were excluded from the study sample. Only beneficiaries with individually purchased or employer-sponsored private supplemental insurance were included in this study.

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